Fort Myers Notebook, N-86-04-03.3

This notebook covers the period April 1886. The entries are by Edison and Mina Miller Edison. Many of the notes and drawings concern fundamental experiments on magnetic fields and lines of force, including those of the sun, earth, and other planets in the solar system. There is also some material relating to the conversion of heat directly into electricity. Other notes and drawings deal with the coating of carbon filaments, armature design, carbons for arc lights, electric railway motors, telephones, phonographs, quadruplex and phonoplex telegraphs, balloon telegraphs, marine telegraphs, a battery for the grasshopper telegraph, a cotton picker, a larynxial piano, a hearing aid, a device for indicating the depth of steamboats, the testing of metals, the expansion of steam engines, spectroscopy, artificial silk, and the separation of cream. Many of the entries are duplicated in Fort Myers Notebook N-86-04-03.1. The first page contains the notations "Fort Myers Fla April 3 1886 Ideas T A Edison." The book contains 280 numbered pages.

Blank pages not filmed: 244-245, 248-249.

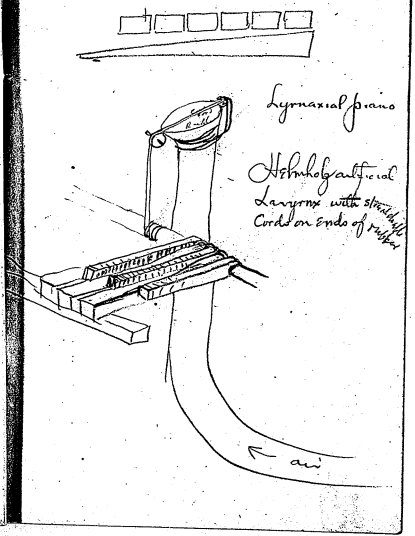
N-86-04-03

Fort Myers Fla
April 3 1886

Ideas

T A Edison

ARTHUR A. KNOLL
PATENT ATTORNEY
MANUFACTURERS
EXCHANGE BLDG.
NEW YORK


Lyrnaxial piano
Helmholz artificial
Larynx with steel ball
Cord on ends of reeds
air

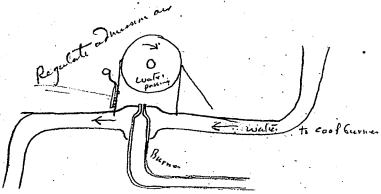
April 3rd 1886 TAE

In the gelatinous Silica for compound Carbons mix minimum quantity Caustic Potash to cause it slightly to fuse at highest temperature to hold Silica together —

Lampblack — Drop on hot plate (red hot to ignite it) Crude petroleum + revolving Cylinder.

With Natural gas Dont use outside Oxygen but mix previous to issuance from burner with the gas - osculate by experiment smallest quantity Oxygen that will take all the Hydrogen of the gas + leave no excess

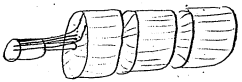
April 3 1886 TAE



or mix air previous with gas -

April 4 1866 TAE –

I propose to rotate the ~~cotton~~ picker spindles by a blast of air acting on a wheel like ~~Blunters~~ and Blowers – the direction being reversable as the spindle goes up or down towards the plant.



Multiple armatures, each armature wound Complete in regular way
Commutator 1st 1 block to wire to 1st armature 2nd block to " " 2nd armature
+so on

April 4 1886 – TAE

On the filiment of carbon coated with silica etc, The thickened ends can be freed from the coating by immersing in an acid – Hydrofluoric, Sulphic etc but this need not be originally coated if each one done by by hand seperately.

The increase in the number of candles per horse power with white radiating surface will be greatly increased

Make a $\frac{1}{10}$ MF Condenser (paraffine) in form Cylinder also one exactly same Capacity or near test both outside then Enclose one in Vacuum – see if vacuum increases Capacity or sharpness –

April 5 1886 TAE

Carbonize less dense material such as paper, wood (pine shellac) & Licorice mixed with MgO by auto preliminary to get high resistance then if it stands well Compound the surface by Mg O –

I think with perfect Carbon the lighter material will answer fully as well as Bamboo & be Exceedingly high resistance Try parchment paper – White Holly Lampblack + Licorice + MgO — Lampblack Ta. + MgO – Licorice + MgO. punch out of rolled sheets of the material Municipal 32^{s} will answer

April 5 1886 T.A.E

Mixtures for filiments which are soft can probably be rolled down between tin foil several layers of material & foil one over the other & rolled together thus obtained. Even

Several might be stamped out simultaneously bent in loop shape & Carbon'd together. The foil melting or could be eat out by acid. Thus making it easier to make fine filiments

April 5 1886 TAE

With Auto Preliminary Soak
Orgnal filiments with Licorice,
Prelim + Carbz req — Then Soak
Licorice + prelim + resoak 2 or 3
times, then Carbz regular
This has never been fairly tried.

April 6 1886 T a E

Arc light Carbons — Before baking make sheets of pottery mixture roll outside Covering on Carbon — make mixture so as to Contraction will be same as Carbon — put it on very thin perhaps 2 or 3 hundredths thin $\frac{1}{1000}$ KD Coat Coat best — Alumina — Mg O Clays —

Grasshopper Battery — Make the size of the Cells as small as possible so as to prevent shoe discharge by large surface. Indiscomin points on vibrator so no fair points to follow up & prevent instantaneous discharge.

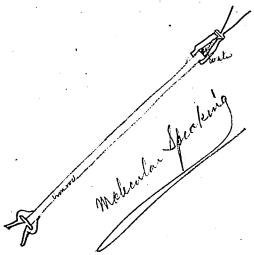
April 6 1886 Tues

Lamp -

Make a mouse mill like Sir Wm T's
& perhaps that gas lighter which I have
in Lab run by motor mill & answer.
Try Counter Static Experts.

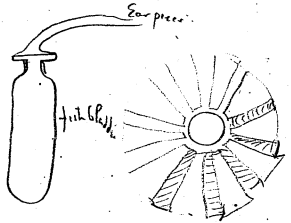
Speaking tube System

Try greatest distance with wide
gas pipe cheapest you can & 35 lbs
pressure see much in tube. - try lead
pipe 1/4 inside dia - also glass tube
1/4 dia inside - These will poss
carry further on a bend than others
but them ends to pour sealing wax
to make joint - Carry pressure high
as possible on gas or lead pipe Experts

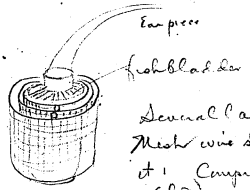


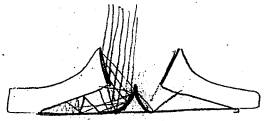
April 1886 TAE

Draf



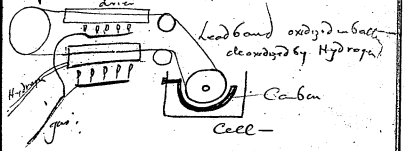
April 6 1886 TAR





Telephone

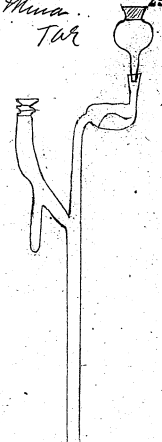
April 6 1886 [illegible]



Conversion of heat into E by oxidation + reduction of O of Lead on Continuously moving band of lead — passing into liquid Close to carbon in proper liquid Lead is oxidized thence thro drier tube thence through Hydrogen reduction tube — to battery again so on Continuously.

April 7 - 1886 Mina.

TAR

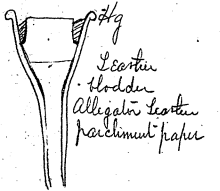


Experiments to get a porous material whose pores will let O through and not N.

April 7, 1886 Mina Tait

Clay plaster paris—
Cork—Lime—natural—
Meerschaum—pressed
Chalk every degree of pressure.
Cocoanut Charcoal—
Bed charcoal—

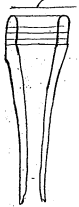
dry clay
moulded skin
phosphates
etc.



Leather
bladder
Alligator leather
parchment paper

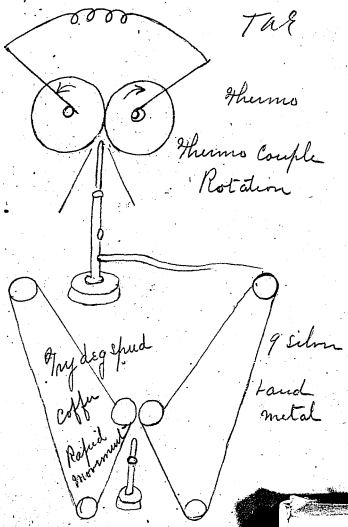
Electrify the
surface of the
porous material

April 7, 1886, Mica Tar



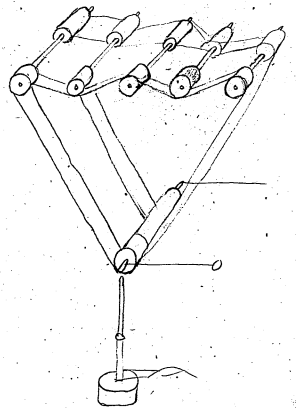
Electrify
parchment paper
Leather, etc.

April 8, 1886, Mina.



April 7-1886, Mina.

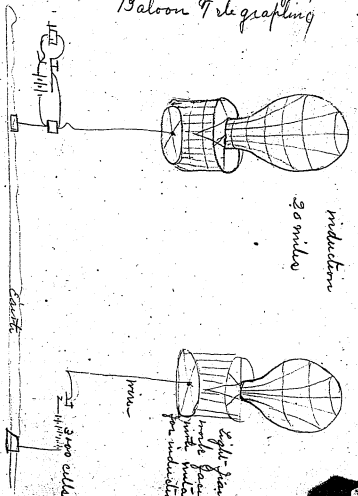
Thurso T.A.E.



April 7 - 1886 Mina Tee

Air Telegraph

Baloon Telegraphing



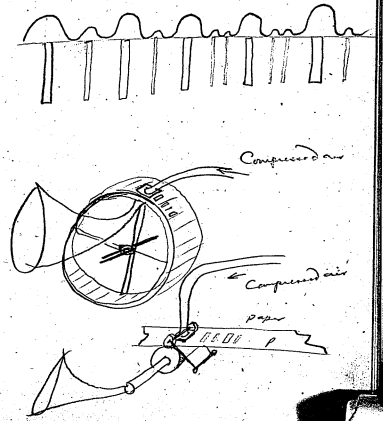
For seperating O from air - draw into a vacuum through immense Surface of iron or other metal perhaps those metals which have an affinity for O. greatly.

Experiments on loops of all metals in Vacuo for Paper in Silliman's Journal -

Cooling molten metals various Kinds in Vacuo — also with Current (strong) passing through metal while heated in Vacuo - also with powerful magnetic field - ditto with Current at various angles

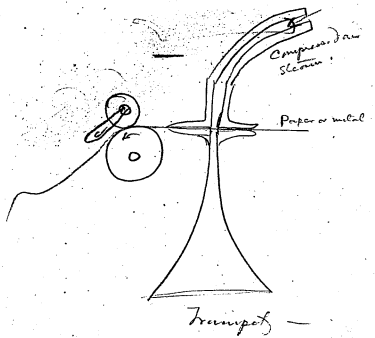
April 8 1886 TAE

Siren Phonograph

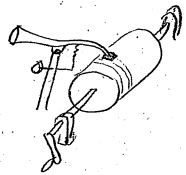


April 8 1886 Tae

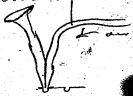
Bien Phonograph

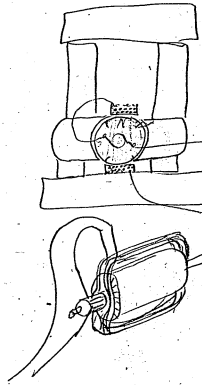


April 8 1886 [illegible]



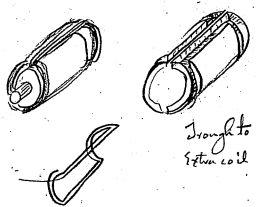
Indenting directly in phonogr
by direct impact of the sound
waves. I think it will reproduce
from same device by exhaustion
of air in lieu of air pressure
as employed [illegible]



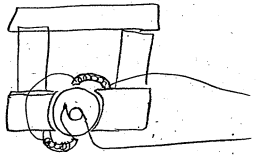


Wind as shown heavy wire 20 ampere spires same as on armature. Then put in main Circuit.

April 11 1886 TAS



April 11 1886 TAE.



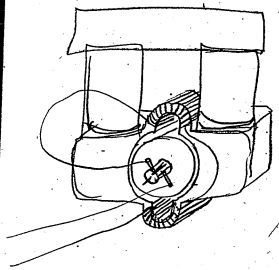
Extra prolongation to shift lines force to keep neutral point constant.

April 11 1886 -

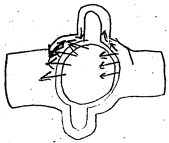
good

Wind armature thus, one turn around then before going to Commutator, start end on another turn round but at right angles + after this turn is made go to Commutator + so on winding whole armature in this way, 1/2 of the wire is available but the other 1/2 prevents the armature to all from sending out lines of force the field is increased + the lines Concentrated so we get about same watts as in regular way just more,

April 11 1886 Fair

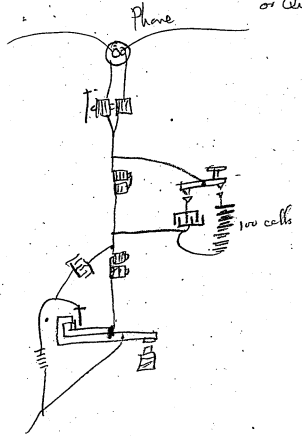


good



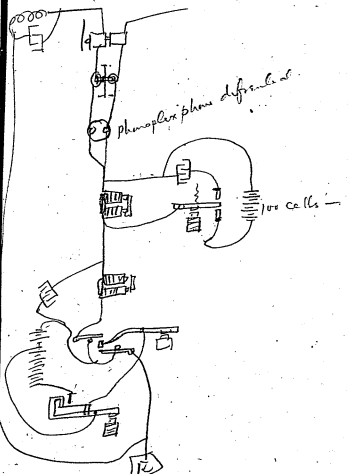
April 11 1886 TAE

Phonoduplex or Quad

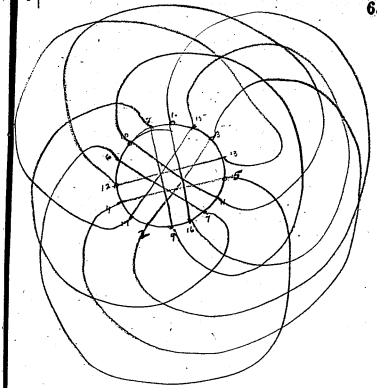


April 11 1886 TAE

Sextuplex by phonoplex

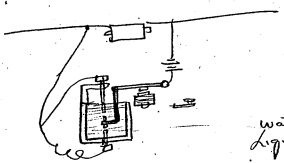


April 1 1966 Tasi



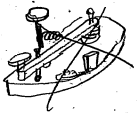
April 11 1886 1902

Phonoplex



water vapor
Liquids

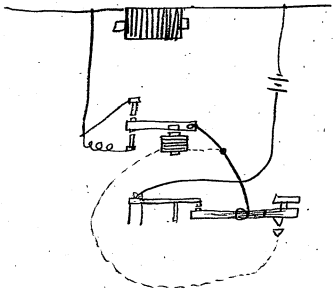
To get rid of the Condensor



April 11 1886

TAE

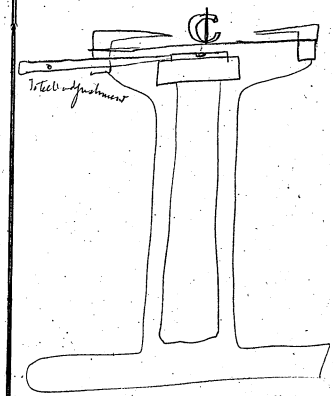
Phonoplex = to prevent battery running down



Good

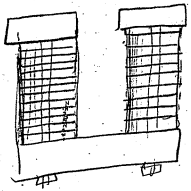
April 11 1886 TAE

Phonoplex

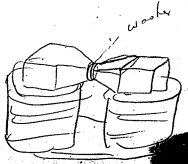


April 11 1886 TAE

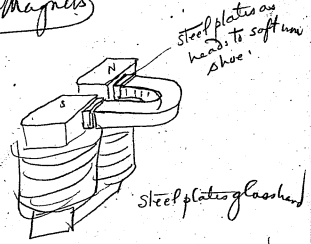
Permanent Magnets.

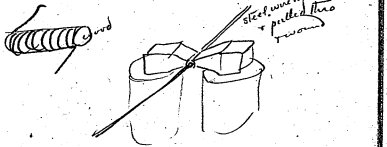


steel washers



Perm Magnets



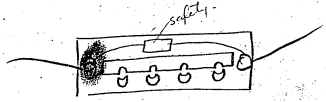


April 11 1886.

T&L

Don't forget about making Zincs of batter of Compound. amalgam of Zinc.

Condensers Safety Catch

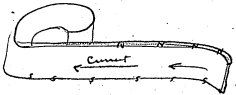


sheet of thinnest paper tissue unparaffined. High volts will jump & Short ckt Card

April 11 1886 TAE

Telephone Receiver -

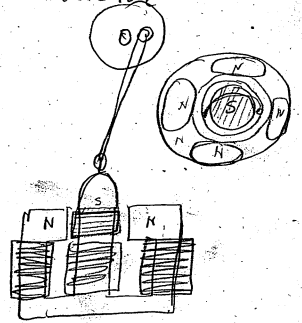
a Current passing through an ~~steel~~ wire makes ½ of one side N other S. same in band



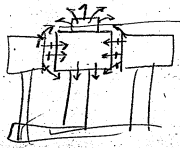
Hence

paper between the coils -

April 11 1886 T.A.E.

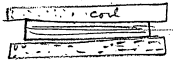


Reciprocating Dynamo
neutral point



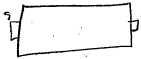
April 11 1888 Quick discharge –

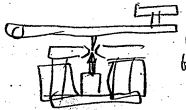
Phenoplex 7 ohm overhanging coil –



overhanging coil. see of Potter

7 ohm Coil with steel wire core magnetized



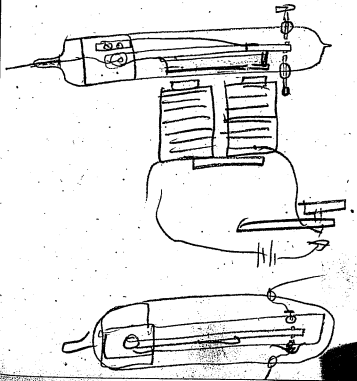


April 11. 1886 —

, J.A.E

Phonoplex quick Break

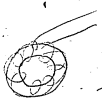
Break ckt in Vacuo



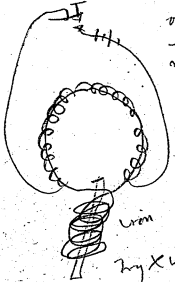
April 11 1886 TAE

XYZ.

PS
Try closed iron magnet 7 thru m phone?

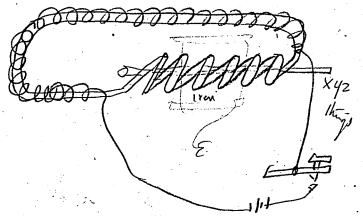


Continuous ring
no magnetic lines
outside yet big
induction see if when
the Current comes
off (i.e) the wire poles
there cant a momentary
magnetism or closing &
opening, immediately
thru ring big
Thoroughly



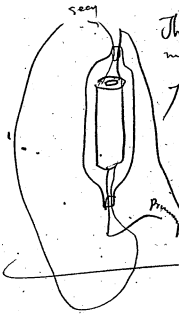
Try XYZ things in this

April 11 1886 JAE



also see if E recovered,

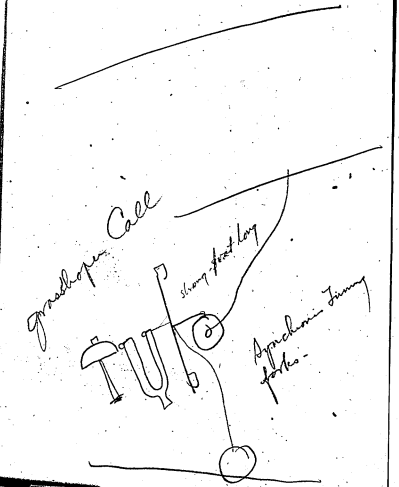
April 11 1886 TAE

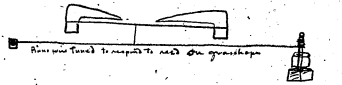


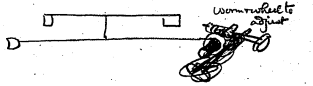
There is another book making 200 ohms resistance + 7 ohm primary 7 ohm photo Coil in Vacuo high

see of charged

glass

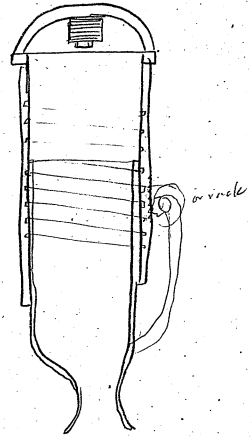

grasshopper Call
Short first leg
Approximate Tuning fork-

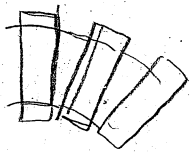

Rivet wire Tuned To respond To reed On grasshopper


Worm wheel to Spindle
Reed
Screw + Carriage
Carriage guide.
adjustment

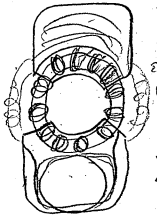
April 12 1866 TAE.

Grasshopper - Receiver with adjustable Chamber so that Column of air can be adjusted periodic with the vibration of the reed —



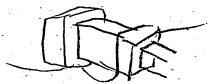


I think Gorrie showed how a cheap gramme which will use the air cooling method of rounding like that shewn in head light Dynamo



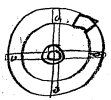
E

wound either with fine Pd wire or right angle winding on armature



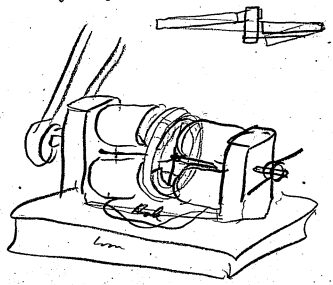
April 12 1886

New cheap Gramme non spkg armature



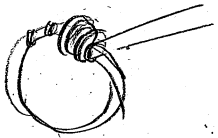
10/1000 sheet iron rings built up with tissue paper

The rings are split and can be sprung Enough to get coils on

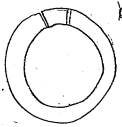


April 12 1886 –

Itrs dautiful to splitting the ring to get coils on is as good as a winding machine



Split bobbin run by belt slowly & fast – first to fill it & slow to unwind & from core –

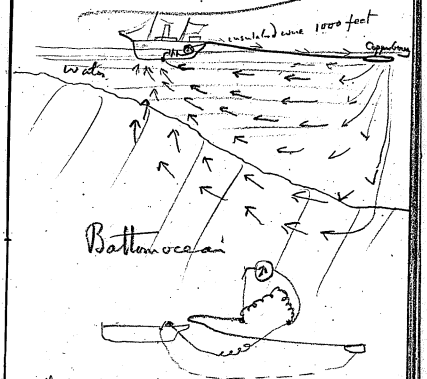


Have 9 patents split tube of all put together for one common opening then after Cock put on Shift them - pronounced

JAE

Device for automatically indicating depth water on steamers Continuously also an alarm by gal needle swinging to a stop & closing Gall cock

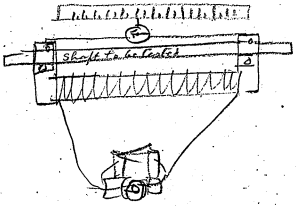
Ocean Sht



The devices put on are subject to Chas Stone Brooklyn

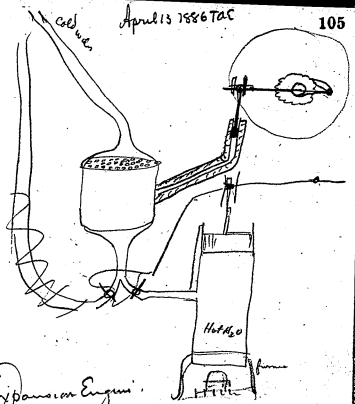
April 13 1886 T.A.E.

Testing quality & homogeneity & for flaws of steel & iron shafts.



Compass need on a Torsion slide along near shaft. If shaft homogeneous The Zero point will be constant if a flaw there will be a Consequent pole & produce a dip in the curve There are many variations possible here —

April 13 1886 TAE



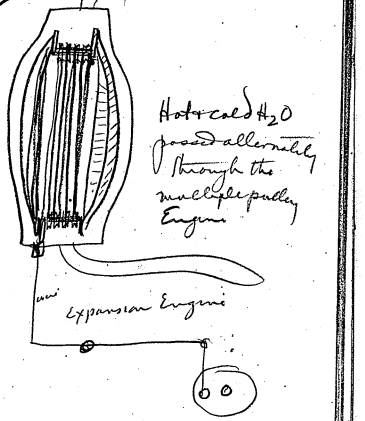
Expansion Engine.

pump the hydraulic press

big Cylinder brass Copper tubes very thick. Or $\frac{1}{32}$ C.F. - 3/16 Bore Cylinder 15-inches long of Copper heavy Copper Ends - 2 feet Long - Hot water 212 let up in then run back into hot boiler & Cold let thro 2 rooms all ~~ends~~ ends = By Sul Carbon or petroleum to good Expansible Engine by Wood

April 13 1886

Fig 9

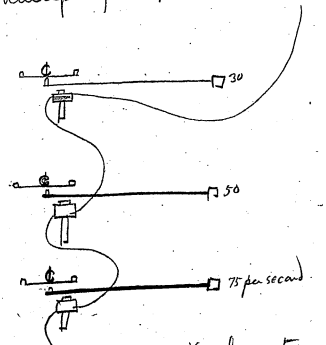


April 13 1886 Tue

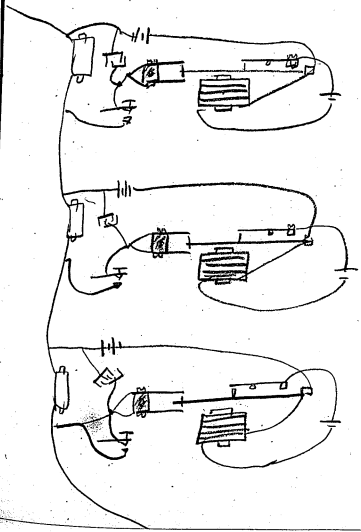
On phenoplex Fig 2 John Coils in Series with 8 cells instead of 4 as same amperes passes through both as one - see if they don't do better if not make one condr. with 4 points so they will leave & close Exactly & use separate Battery & Separate Condenser around the sparking points. perhaps the 2 Coils in Series require 8 cells Causes such high EMF at points that to get rid of spark too much Condenser must be used & thus take it from the line

April 13 1886 TAE -

Multiple phenoplex

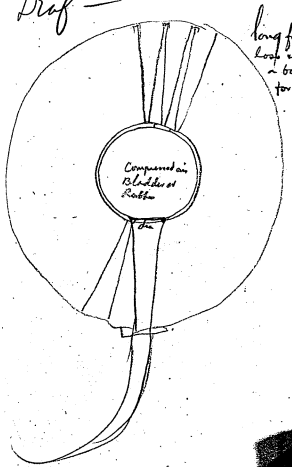


April 13 1886.
"multiple phonoplex."



April 14. 1886 TAE

Drof —



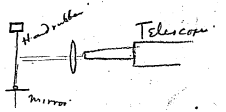
April 13 1886 Tue –

Try dissolving Licorice in heard boiled Linseed oil – then coat tin foil with thin layer dry naturally. Then recoat till get it 10/1000 Then put in hot oven & keep 48 hours –

also Try linseed films. Compound to many films in one & use hot oven. The reason previous Experiments with films didn't work well was that they were only naturally dried while they should be dried by hot oven slowly raising heat.

also Try tissue paper moistened & calendered no holes dip & dry naturally & then bake slowly with high heat many

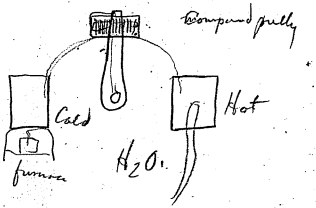
April 14 1866 Tai.



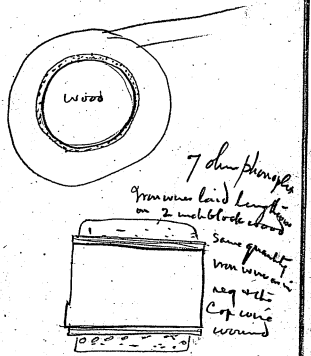
25-foot scale –

April 14. 1886 Tag

Dyspnoea when the thin



April 14 1886 Tue

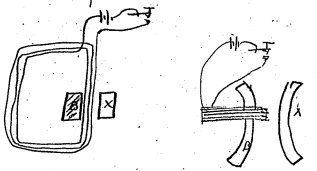


7 ohm thermopile
Germanium laid lengthwise on 2 wood blocks about
Same quantity Germanium used as before
Cop wire wound

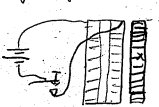
Lengthwise

April 15 1886 7 a.m.

Try some fundamental experiments on lines of force. The present theory does not seem to explain certain Expts.



B + X from acc if X magnetized - loss if it proportionate -

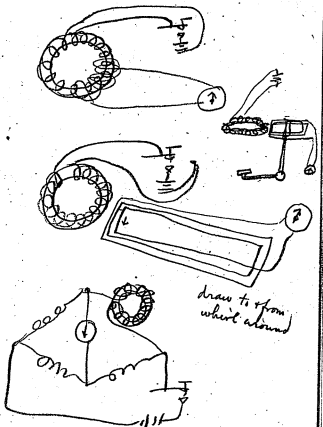


X from acc if mag-5 loss the proportion between it and when no Coulter.

also move it by 1/12 outside as the arrow measure relative strength.

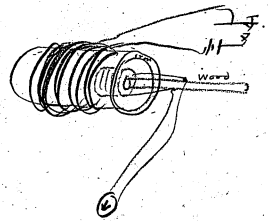
April 15 1886

Fundamental magnetic Equals



April 15 1886 TAE

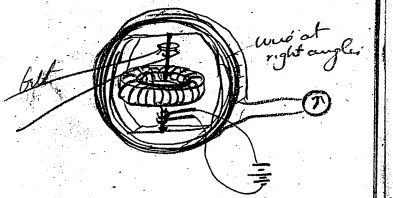
Fundamental Magnetic Experts



move in every direction
+ plot the strengths of
in direction

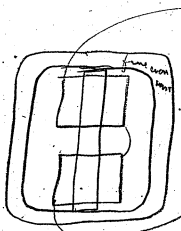
April 15 1886 TAE

Fundamental Magnetic Experiments



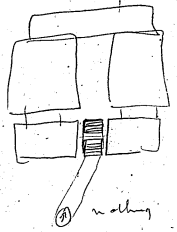
April 15 1886 TAE

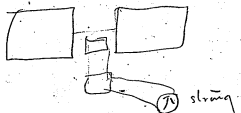
Phenaflex Coil



April 15 1886 TAE

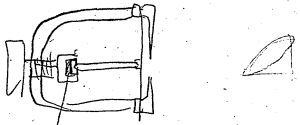
Fundamental Magnetic Experiments





April 15 1886 Tal

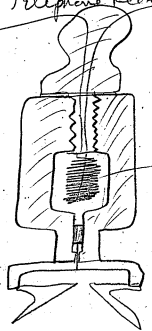
Telephone Receiver



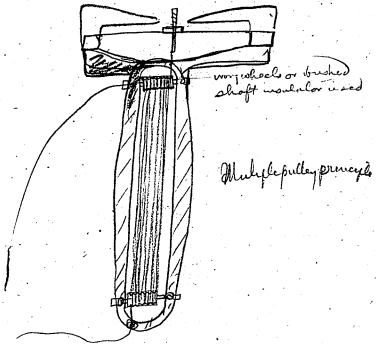
diff substances pressed Chalk Lime & every other salt dry + also moist Emf action,

April 15 1886 TAB

Telephone Receiver

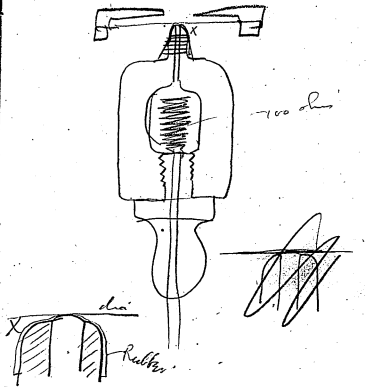


April 15 1886 TAE



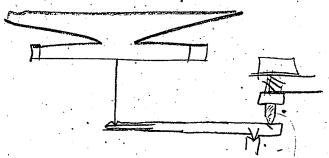
April 15 1886 TAE

Telephone Receiver



April 15 1886

The Telephon Recor



The Thomas Recorder Telephone Co.

all that is necessary is leverage on the class of receivers —

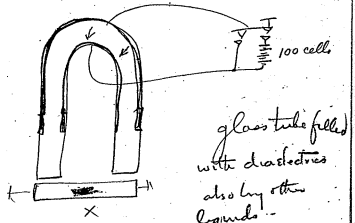
April 15 1886 TAE

XYZ

If the molecules of an element like a metal is effected when a line of magnetic force strikes one side of the wire, giving a Current in one direction & when merely allowing the line of force to strike the other side a reverse Current, Then it is very likely that Compounds (not elements) should be effected diffrent - hence dynamo mac wound with Hard rubber - Tubes containing liquids instead of iron - & moulded solids & wires or rods like peroxides etc —

April 15 1886 –

X Y Z

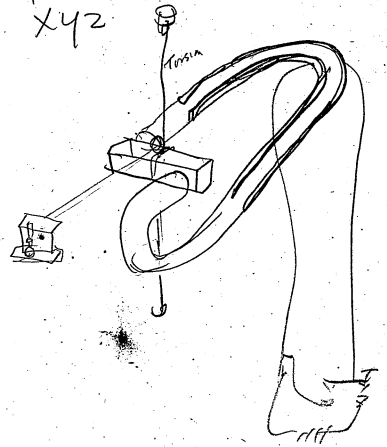


glass tube filled with diaelectrics also by other liquids –

Cutting with E lines of force at right angles ought to produce an ether form Energy along the Compound & thus produce an attraction. X is trough containing same liquid or others – also all Solids & metals, by different kinds & as some may be non conductors of X Y Z – by metals a better device next page.

April 15 1886 TAE

X42

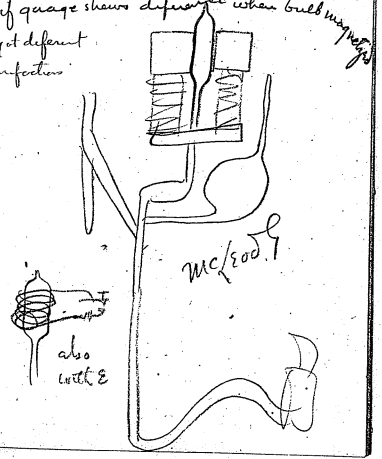


April 15 1886 153

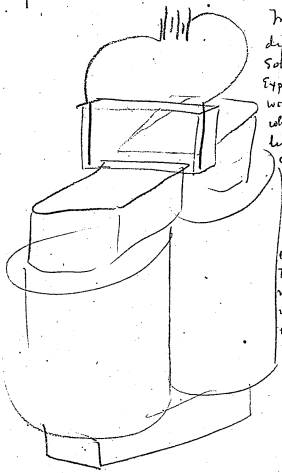
Fundamental Magtc Expmt

ascertain when a fair Vac is obtained
if guage shows diffuse when bulb magnetized

hyst different
ranfections



April 16 1883

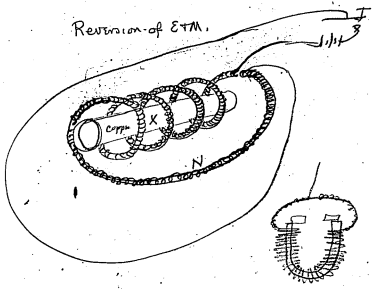


Trough containing different Conducting Solution -
Expt is to see if with dilute Sols whether the weight to lower will not cause the Attraction of the Electric Lower & with it the Conducting wire to Concentrate. The Legend means a Cleaning wire pure water in top of cell

April 16 1886 - T.A.E

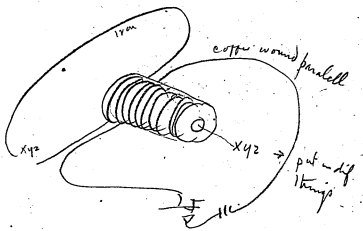
XYZ -

Revision of E+M.



a Copper horseshoe wound with several layers of softest iron wire ⅛ thick over the whole length of which is wound insulated wire + charged powerfully with battery.
Exput for XYZ but Copper poles

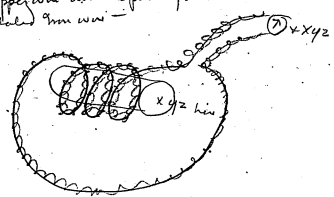
April 16 1886 Tait

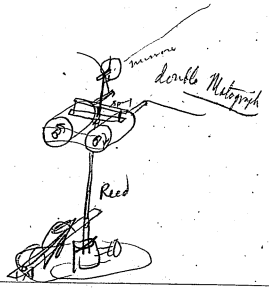


April Assistant?

X42

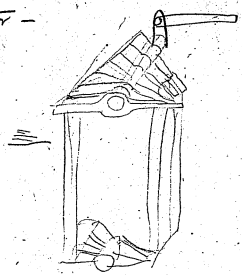
Copper wire wound separately with insulated 9mm wire —





April 15 1886 Thurs

Pasimeter –



April 16 1866 TAE

Air Telegh-

Barometer at Geneva Geny
27.08. on top Mt Blanc
15 732 feet above sea was
~~16.08~~ 16.08. correct Geneva
by Sea Level. Than Experiment
on long Vacuum Tube for
Conducting vibration from 7 ohm
phonoplex Coil to telephone
at diffrent pressure use
regular Hg Gauge as McLeod
not required —

27.
11
5-4

27
324
8) 40-
4
160-

140

125
70
875-0

April 16 1886 TAE —

On Top Mt Blanc difficult to make yourself heard

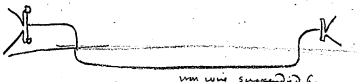
The Barom 16.08, hence

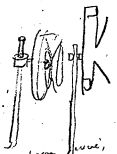
The Compressed air for Deaf Device & in long speaking Tubes is OK

Try Alcohol or other liquid instead Compressed air in fish bladder —

April 16 1886 – TAE

= Important patent was the work up again of my underground telephone – No Electricity –
In water a bell is heard 45000 feet which in air can only be heard 656 feet, Vel of sound in Water 4900 per sec from 17,000





Iron wire,

Iron wire suspended by strings in a box in the Earth only transmit the sound Molecularly not move The whole coil is also just Buried in the Earth Trace how far can transmit –

Try different forms of transmitter & receiver

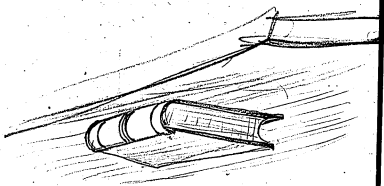
April 15 1886 - Tac

Diamond Non-E Telephone

Perhaps the buried wire could be wrapped with loose cotton land lengthwise, + slightly bunched over to hold it in its place - This would prevent transmission of vibrations to outside matter,

Experiment to find a non-conductor of sound from an non wire to matter around it -

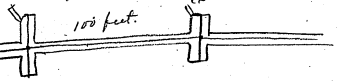
glass tubes or even lead tubes with fine piano wire in 200 feet lengths could have a vacuum in it sectionally + the joint be made an elastic one so vibration would be cut off for miles

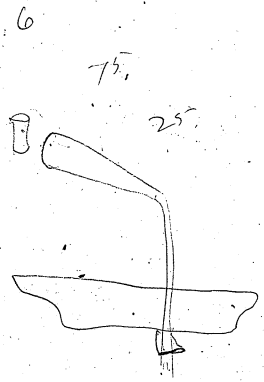


April 16 1886 Tal —

Iron wire Non-E Telphan

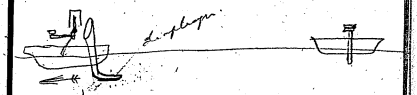
The lead pipe or glass pipe or even Copper with fine wire could have a diaphragm Joint



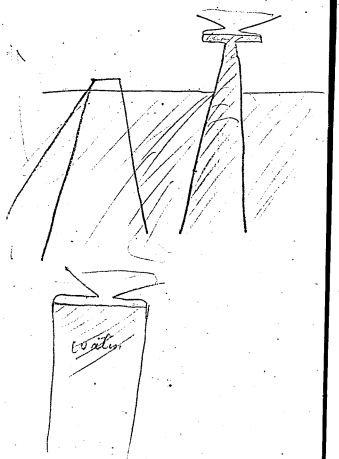


April 16 - 1886 TAE -

Telegraphing at sea

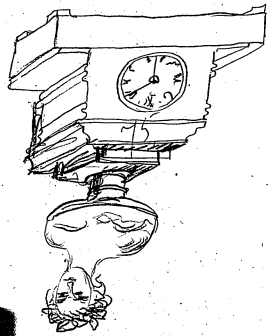


as sound will travel 50 times further in water than air - I propose to run from a steam whistle are large funnel & tube to water under the steamer the End is provided with a diaphragm; or mat as experiment will determine - by cutting whistle into breaks we have dots & dashes which are composed of vibrations, these are communicated to the water. on another ship a tube runs up from the bottom of vessel with water in



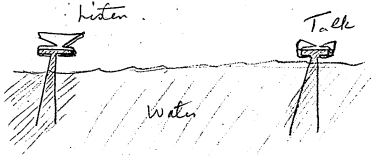
Maxime Leigh

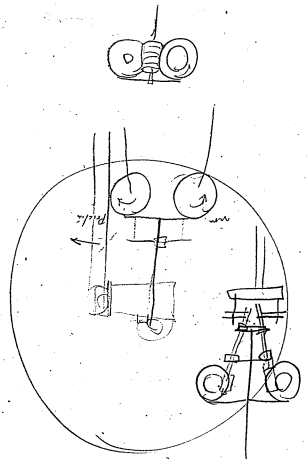
or a diaphragm is on the End and a thread passes up to another diaphragm to receive the impulses. Thus. Each vessel being provided with sending and receiving apparatus Communication can be had a distance probably of 25 miles. a Siren, or heavy vibrating fork may be arranged to give vibrations to the water,



April 16 1886 TAE

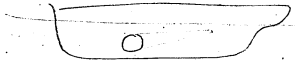
Experiment in water telephone transmission



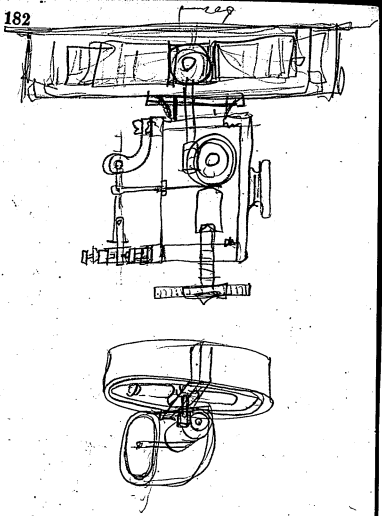


April 16 1886
Marine Telgh

x funnel 50 feet long closed on end but full. Cotton (closed by parchment etc.

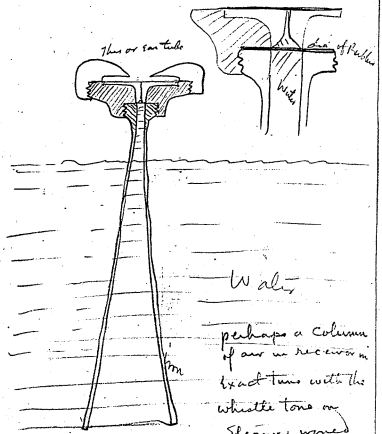


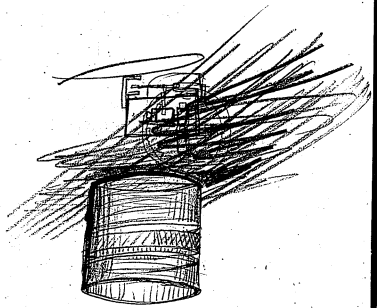
Also diagram on side of ship deep down + long funnel towards object to Torpedo to note 2 feet 3 feet in area covered by [illegible]



April 16 1886

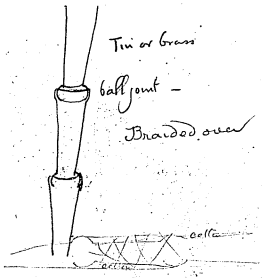
Water Telephone Receiver


Thin or sensitive
Wax
Water
perhaps a Column of air in resonance in exact tune with the whistle tone or Steamer moved body



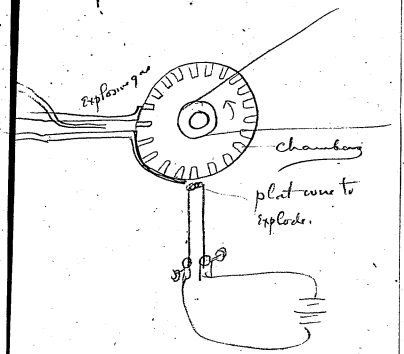
April 16 1886 TAE

Flexible Ear tubes of metal



April 15 1886

Explosive Siren



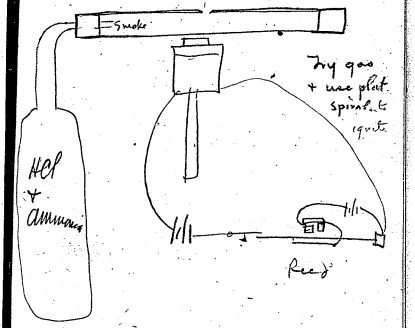
April 16 1884
TAR

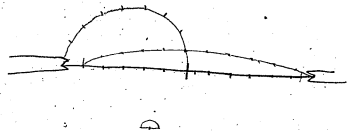
Listen

See if sound most powerful indirect line —

Smallest for projection —

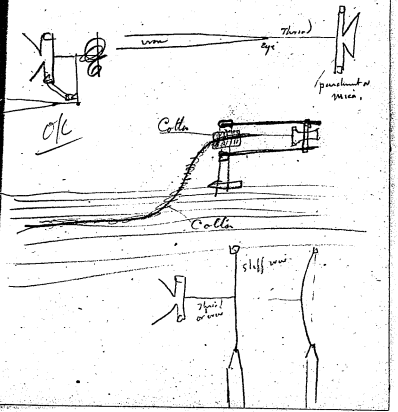
Smoke rings



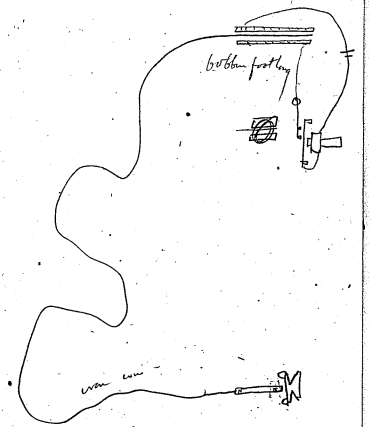


April 16 1886 TAE

Molecular Receiver from iron wire
magnet Telephone Nun-E.

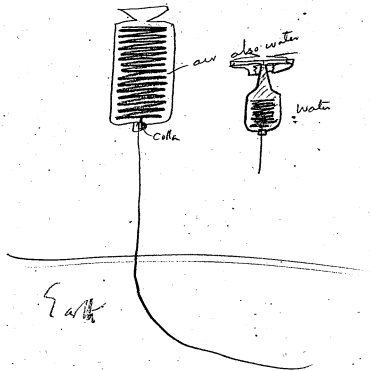


April 16 1886 Tue



April 16 1886 TAE

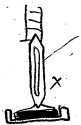
Molecular recor



April 16 1886

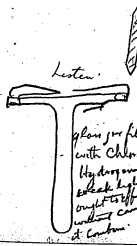
TAE

True photophone.



solution used for negative decomp by light.

Beam flashed from flash produces a decomp & vibration to X



Thin under pressure Coated with Collodion + silver salts - esp Bichromate (+) Gelatine Effect Light to produce Change which must lessen more or decrease tension on diaphragm + beam connected to Carbon button + telephone at receiving

glass jar filled with Chlorine + Hydrogen when struck by light ought to affect it under Chemical & Carbon

April 16 1886 —

Mfr of Silk Gum Chicle

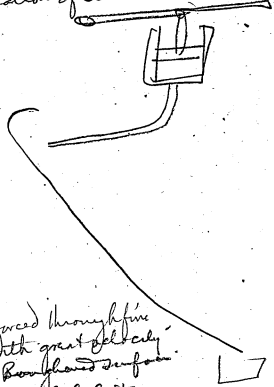
glue mixed with Brahmaputra Polvoth
proper proportion made in cylinder &
plunged in larger body of Hydrocarbon
solid - soften & pull out
afterwards dissolved Carbon - Exposure
from fulminate of Gold alters to Light.

Bases — Collodion — Cupro Ammonium
paper — gutta percha — Balata —
Rubber dissolved in Benzol or
Bisulphide Carbon with which Rosin &
various other Hydrocarbons dissolved
until Red Reduced form Rubber
has slight Elasticity — Exterior
Can be glue — Licorice — Molasses
Candy — fibres not in Continuous
length to be made by working over &
under the Candy with Rubber Rosin
Cover & then disbelonging in hot water
Cover & then dissolving in hot water

MC Queens Mass Dyo Strong
glycerol acetic acid. Substances Fine
to copy mass drawn out silk threads
thro actinic rays into Bichromate Dyo

April 16 1886 TAE

Seperation of solid matter in Milk



Milk forced through fine
hole with great velocity
upon Boards and perfo-
-rated Globules
unbreakable ones from
Down inclined

April 16 1886 JAE

Separation Cream from Milk

Try Grahams Dialysis — use also Electricity thro porous diaphms.

Use porous diaphms various ~~Unterwasser~~ ~~tubulares~~ — use Vacuum ~~under~~ ~~the~~ use air pressure on one receptacle to free pores of globules & next receptacle use Vacuum to draw ~~with~~ of milk through —

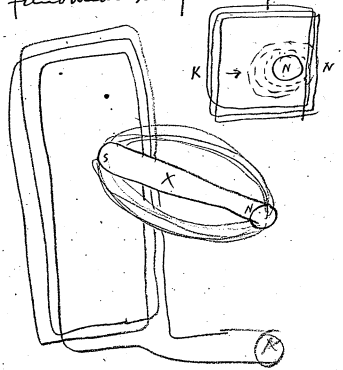
Evaporate in Vacuum —

Freeze ~~Hoff~~ H_2O —

Try filtering through long tube filled with fine pulverized ~~sand~~ use Vacuum to draw — Can fungal through porous substance

April 16 1886 TAE

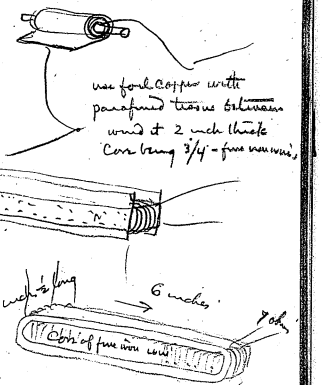
Fundmtal Magnetic Expt

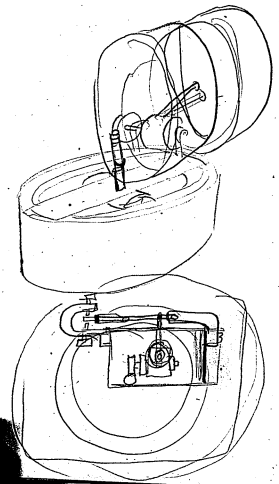


X Steel Mag- move it from N
toward K but not enough so K
will come within range of lines of force
to the drawing in toward
want to ascertain
ment of lines of force or not.

April 16. 1886 T.A.E.

Phenoplex Coil, sheet wound as shown

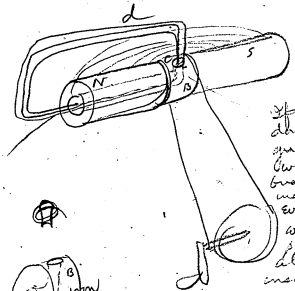




April 16 1882 et al

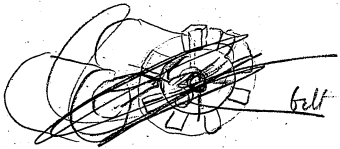
Fundamental Theory Expmt

Faraday -



If the iron don't act as guard - brush G with thick brush of copper mounted from everything though which wire passes also not insulated

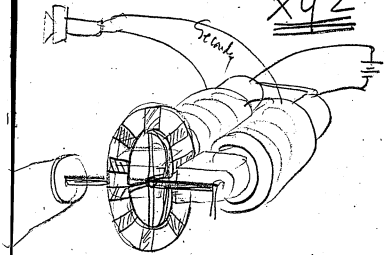
Revolved - See if B is good guard -


belt

April 16 1886 TAE

Fundamental Magnetic Experiment

XYZ.



a powerful permanent magnet would be better or the primary only on one side of a bridge & tap from 6 dynamos were thereby rotated with great velocity. at different spots has a piece of substance or cell with [illegible] to see if there is any that will retard magnetism See 215

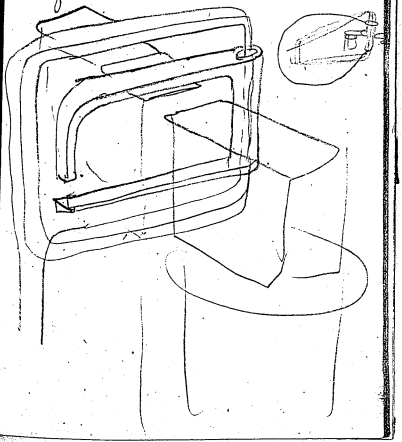
X42

If any substance will disturb the lines of force and the wheel is turned sufficient fast to give a musical note it will be heard in telephone, now if this disturbance is created without the production of Electricity or magnetism then we have a new form of Energy

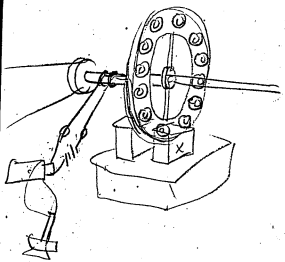
April 16 1886 + aE

Fundamental Expmt

pull thro with & with heavy Copper guard closed—



April
XYZ



Electric pen spools no mag
X legends ~~+ subtle~~
to see if the Electric field is
disturbed,

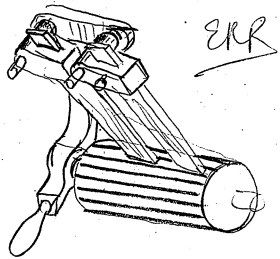
April 16 1886 T A2

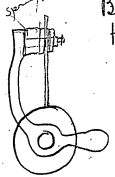
Milk –

Try dissolving out butter oil with Bisulphide Carb Etc – Then Evap P.S.

April 16 1886 Tai

E.M.R

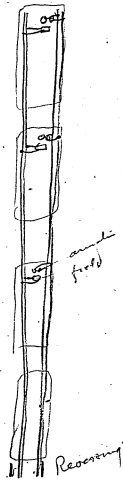




Brush device for motors that reverse direction of rotation

April 17 1886. 225

Elec R

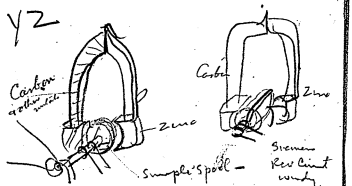


Work up idea of accelerating bobbin to work a Centrifugal Clutch Running in oil

April 17 1886

Tait

XYZ



wound wire on hard rubber & other substances.

Cylinder ½ Zinc
½ Carbon or Copper
wire wound perpin & at right angles.

The particles between Z & C become charged & ought to give something

April 7 1886 TAE

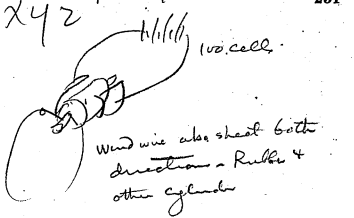
X42

If Electricity passing in a wire is given off as heat, Then a wire under some kind of polar environment give off electricity when the same is conducted along it from high to low temperature

Applen of heat to a wire & following it to Conductor to form a magnetic field ought to give Electricity

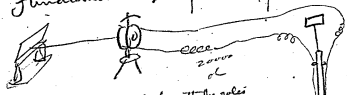
April 17 1886

X42

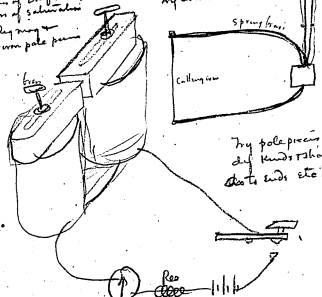


April 7 1886 Tah

Fundamental Magnetic Exput



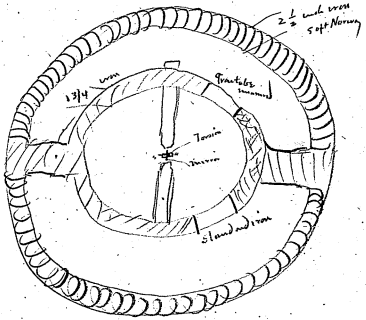
Determine accurately relative Emf with the poles at different distances on two plot curve — 39 inch pole
also Substitute magnets with Exactly same poles but diff lengths make curve — also
curves of Emf at different distances equal with diff
degrees of Saturation
Try Cast iron magnets
also Ray magnet
Cast iron pole pieces



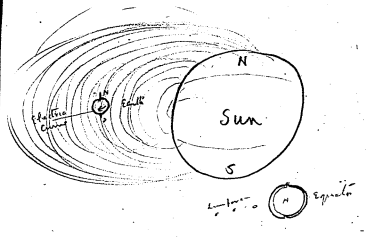
April 7 1886 TAE

Fundamental Magtic Expmt

Magnetic bridge.



April 17 1886 Sat



The Earth revolving around the sun
Cut the lines of force so the Current
tends to pass around both sides of
it thus wound neutralize symmetrical
Effect were it not that the side
of the Earth so heated & thus gave
direction to the Current around
the Equatorial Belt, Thus
makes the magnetic poles

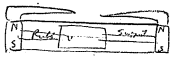
April 17

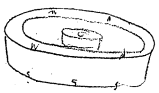
and The Electric Current + Consequent
magnetism causes the attraction
to the sun the Orbit of the Earth
is the point where the tendency
to go off in a ~~straight~~ tangential line is
balanced Exactly by the Mutual
attraction of the Electric Current
+ magnet of the Earth + magnet of
the sun

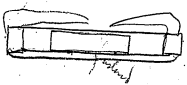
April 7 1886

Telephone

Quick discharge



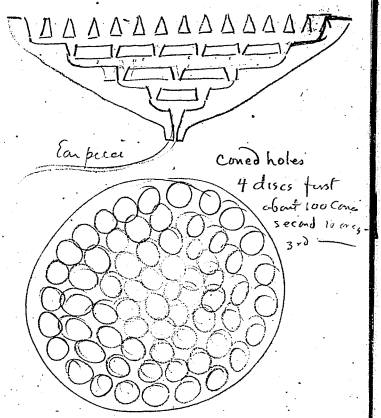


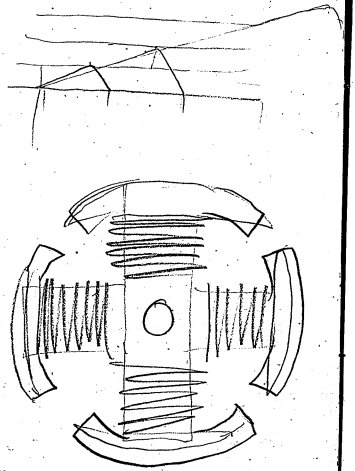


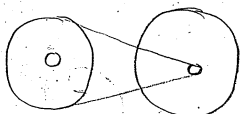
14
14
56
14
196

36
11
396
1.4

April 7 1856
Drab.







5 inch = 15.

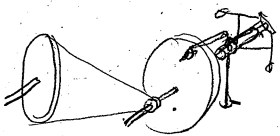
1 inch Equals 3 inches

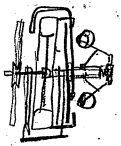
5 to one - 6 inches

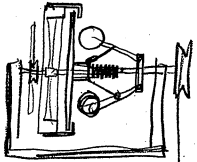
1 Rev per Second. 18 inch

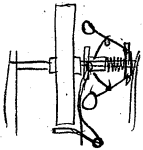
90.

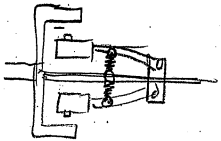
2½ 7½ × 90.

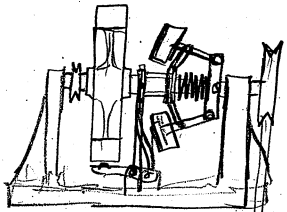


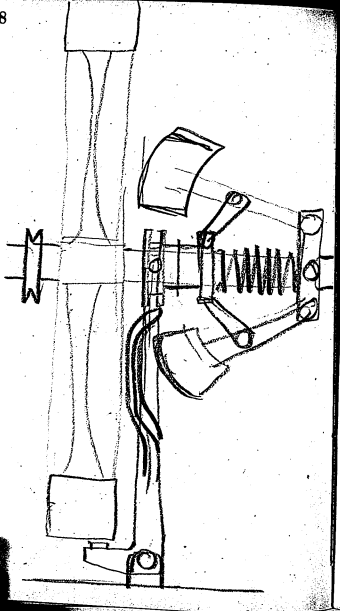


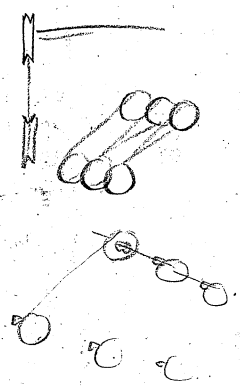


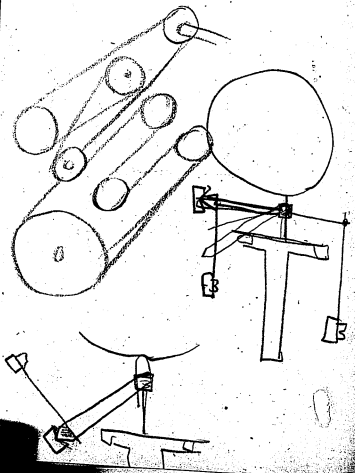


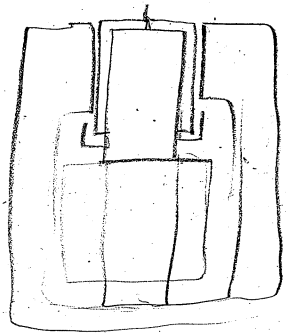


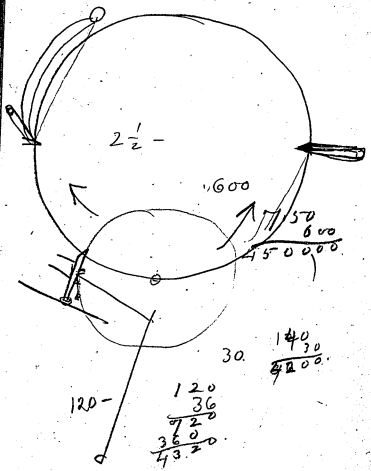








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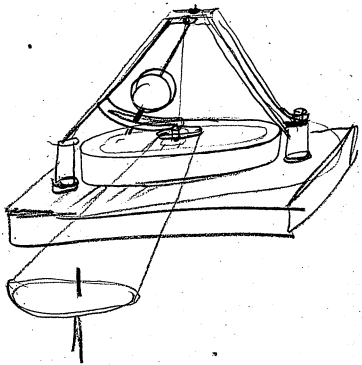

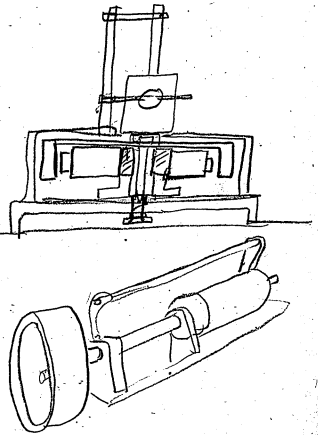

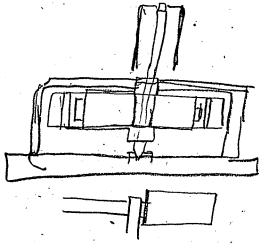

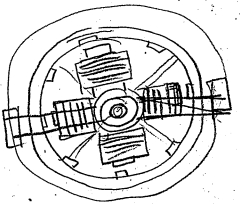

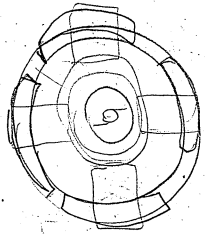

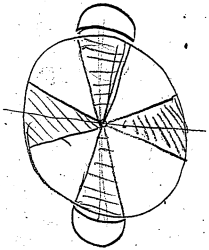

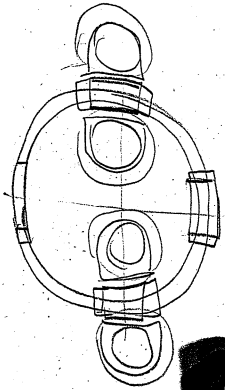

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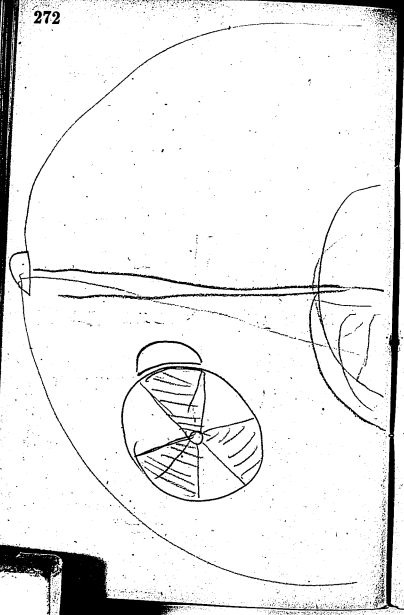

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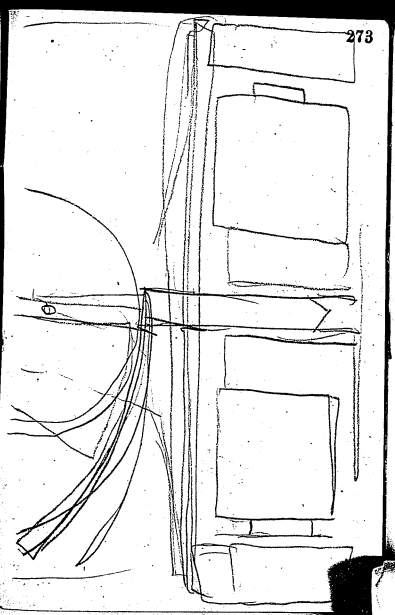
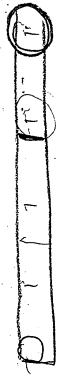
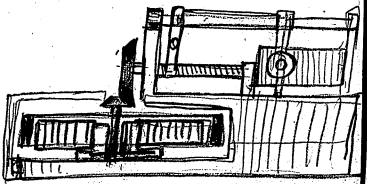
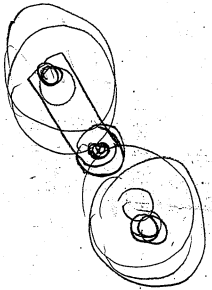
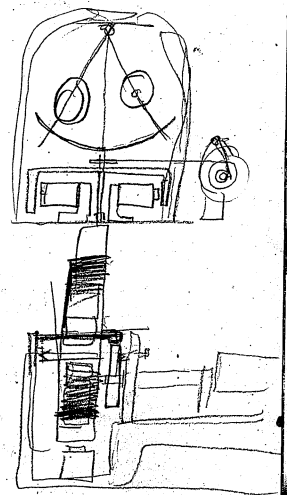
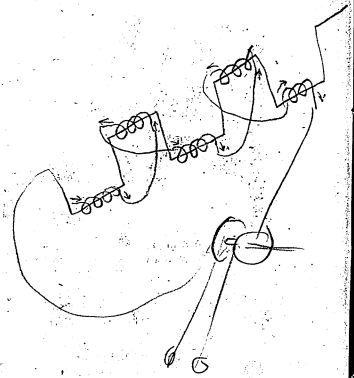
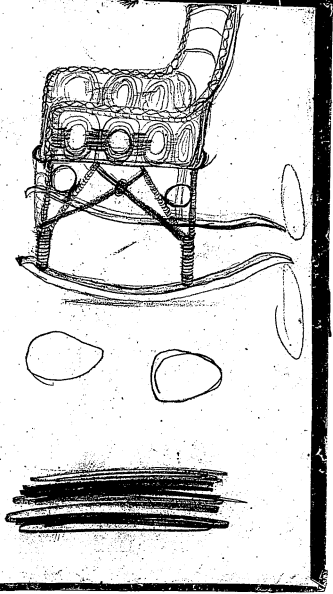




Photograph



Phonograph